

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended): A vinyl-based polymer having a mass average molecular weight of 1500 to 10000, which is prepared by a first step of continuously feeding a material mixture containing comprising a vinyl-based monomer and a solvent selected from the group consisting of aromatic hydrocarbons, ketones, esters, alcohols, and mixtures thereof, to a continuous tank type first reactor, and polymerizing the vinyl-based monomer under conditions of a polymerization temperature of 150° to 300°C and a retention time of 1 to 60 minutes at a rate of polymerization of 50 to 99% to obtain a reaction intermediate mixture; and a second step of feeding a polymerization initiator in an amount of 0.01 to 5 parts by mass based on 100 parts by mass of the vinyl-based monomer and the reaction intermediate mixture to a second reactor, and further polymerizing the vinyl-based monomer under conditions of a polymerization temperature of 100° to 200°C and a retention time of 10 to 240 minutes at a rate of polymerization of 80% or more.
2. (Original): The vinyl-based polymer according to claim 1, wherein the vinyl-based monomer is a styrene-based monomer and/or an acryl-based monomer.
3. (Original): The vinyl-based polymer according to claim 1, wherein the polymer contains epoxy groups, and has a mass average molecular weight of 2000 to 7000.
4. (Original): The vinyl-based polymer according to claim 3, wherein the polymer has an epoxy equivalent weight of 250 to 500 g/eq, and a glass transition temperature of 10° to 50°C.

5. (Original): The vinyl-based polymer according to claim 3, wherein the polymer contains hydroxyl groups, and has a hydroxyl group equivalent weight of 250 to 2500 g/eq.

6. (Original): The vinyl-based polymer according to claim 1, wherein the polymer contains carboxyl groups and/or acid anhydride groups, and has a mass average molecular weight of 2000 to 7000.

7. (Original): The vinyl-based polymer according to claim 6, wherein the polymer has an acid equivalent weight of 250 to 500 g/eq, and a glass transition temperature of 20° to 70°C.

8. (Currently Amended): A method for producing a vinyl-based polymer, comprising the steps of:

a first step of continuously feeding a material mixture containing comprising a vinyl-based monomer and a solvent selected from the group consisting of aromatic hydrocarbons, ketones, esters, alcohols, and mixtures thereof, to a continuous tank type first reactor and polymerizing the vinyl-based monomer under conditions of a polymerization temperature of 150° to 300°C and a retention time of 1 to 60 minutes at a rate of polymerization of 50 to 99% to obtain a reaction intermediate mixture; and

      a second step of feeding a polymerization initiator in the amount of 0.01 to 5 parts by mass based on 100 parts by mass of the vinyl-based monomer and the reaction intermediate mixture to a second reactor, and further polymerizing the vinyl-based monomer under conditions of a polymerization temperature of 100° to 200°C and a retention time of 10 to 240 minutes at a rate of polymerization of 80% or more.

9. (Original): The method for producing a vinyl-based polymer according to claim 8, wherein a resulting polymer has a mass average molecular weight of 1500 to 10000.

10. (Original): The method for producing a vinyl-based polymer according to claim 8, wherein the material mixture contains the polymerization initiator in an amount of 0.01 to 12 parts by mass based on 100 parts by mass of the vinyl-based monomer.

11. (Original): The method for producing a vinyl-based polymer according to claim 10, wherein the polymerization initiator is used in an amount of 0.01 to 8 parts by mass based on 100 parts by mass of the vinyl-based monomer.

12. (Original): The method for producing a vinyl-based polymer according to claim 8, wherein the material mixture contains a solvent in an amount of 200 parts by mass or less based on 100 parts by mass of the vinyl-based monomer.

13. (Original): The method for producing a vinyl-based polymer according to claim 12, wherein a content of the solvent is 2 to 100 parts by mass based on 100 parts by mass of the vinyl-based monomer.

14. (Original): The method for producing a vinyl-based polymer according to claim 8, wherein the material mixture is continuously fed to the first reactor after preheating.

15. (Original): The method for producing a vinyl-based polymer according to claim 8, wherein the polymerization temperature in the first step is 200° to 280°C.

16. (Original): The method for producing a vinyl-based polymer according to claim 8, wherein the rate of polymerization in the first step is 80 to 98%.

17. (Currently Amended): A thermosetting coating composition comprising:  
a polymer solution (A) comprising, as a main component, a vinyl-based polymer having a mass average molecular weight of 2000 to 7000 and having epoxy groups, an amount of a residual monomer containing vinyl groups of 1% by mass or less and a resin solid content of 50 to 90% by mass, wherein the vinyl-based polymer is prepared by a first step of continuously feeding a material mixture containing comprising a vinyl-based monomer and a solvent selected from the group consisting of aromatic hydrocarbons, ketones, esters, alcohols, and mixtures thereof, to a continuous tank type first reactor, and polymerizing the vinyl-based monomer under conditions of a polymerization temperature of 150° to 300°C and a retention time of 1 to 60 minutes at a rate of polymerization of 50 to 99% to obtain a reaction intermediate mixture; and a second step of feeding a polymerization initiator in an amount of 0.01 to 5 parts by mass based on 100 parts by mass of the vinyl-based monomer and the reaction intermediate mixture to a second reactor, and further polymerizing the vinyl-based monomer under conditions of a polymerization temperature of 100° to 200°C and a retention time of 10 to 240 minutes at a rate of polymerization of 80% or more; and  
a polymer solution (B) comprising, as a main component, a vinyl-based polymer having a mass average molecular weight of 2000 to 7000 and containing carboxyl groups and/or acid anhydride groups, and an amount of a residual vinyl group-containing monomer content being 1% by mass or less and a resin solid content of 50 to 90% by mass, wherein the vinyl-based polymer is prepared by a first step of continuously feeding a material mixture containing comprising a vinyl-based monomer and a solvent selected from the group

consisting of aromatic hydrocarbons, ketones, esters, alcohols, and mixtures thereof, to a continuous tank type first reactor and polymerizing the vinyl-based monomer under conditions of a polymerization temperature of 150° to 300°C and a retention time of 1 to 60 minutes at a rate of polymerization of 50 to 99% to obtain a reaction intermediate mixture; and a second step of feeding a polymerization initiator in an amount of 0.01 to 5 parts by mass based on 100 parts by mass of the vinyl-based monomer and the reaction intermediate mixture to a second reactor, and further polymerizing the vinyl-based monomer under conditions of a polymerization temperature of 100° to 200°C and a retention time of 10 to 240 minutes at a rate of polymerization of 80% or more.

18. (Original): The thermosetting coating composition according to claim 17, wherein an amount of the polymer solution (A) is 10 to 85 parts by mass and an amount of the polymer solution (B) is 10 to 85 parts by mass, based on 100 parts by mass of a total amount of the composition, and a total amount of the polymer solution (A) and the polymer solution (B) is 50 to 99 parts by mass.

19. (Original): The thermosetting coating composition according to claim 18, further comprising an auxiliary curing agent (C) in an amount of 1 to 50 parts by mass based on 100 parts by mass of a total amount of the composition.

20. (Original): A coating material comprising the thermosetting coating composition according to claim 17.